

### Features

- Uses advanced SGT technology
- Extremely low on-resistance  $R_{DS(on)}$
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)

Product Summary			
$V_{DS}$	$R_{DS(on)}$ (m $\Omega$ ) Typ	$I_D$ (A)	$Q_g$ (Typ)
-40V	6.1 @ -10V -40A	-73	50nc

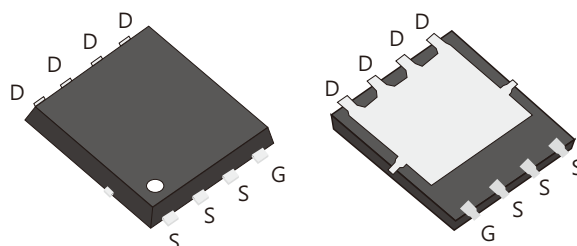
### Mechanical Data

- Case:DFN5 $\times$ 6 Package

DFN5 $\times$ 6  
DS061P04G

### Application

- Power switching applications
- DC-DC converters
- Full bridge control



### Ordering Information

Part No.	Package Type	Package	Quality(box)
DS061P04G	DFN5 $\times$ 6	Tape & Reel	5000

### Block Diagram

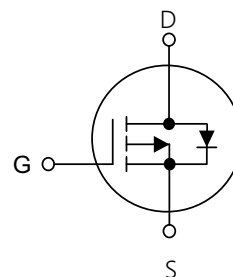


Table1 Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ , unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	-73	A
		-46	
Pulsed Drain Current (Note 1)	$I_{DM}$	-292	A
Single Pulse Avalanche Energy(Note 2)	$E_{AS}$	420	mJ
Power Dissipation $T_c=25^\circ\text{C}$	$P_D$	60	W
Operating Junction and Storage Temperature	$T_J/T_{STG}$	-55~+150	$^\circ\text{C}$

Table 2. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance Junction to Case,Max	$R_{\theta JC}$	2.1	$^{\circ}\text{C/W}$

Table 3. Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	V <sub>GS</sub> =0V,I <sub>D</sub> =-250μA	-40	-	-	V
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =-40V,V <sub>GS</sub> =0V	-	-	-1	μA
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> =20V,V <sub>DS</sub> =0V	-	-	100	nA
	Reverse		V <sub>GS</sub> =-20V,V <sub>DS</sub> =0V	-	-	-100	nA
On Characteristics(Note 3)							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =-250μA	-1.0	-	-2.0	V
Static Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V,I <sub>D</sub> =-40A	-	6.1	7.0	mΩ
			V <sub>GS</sub> =-4.5V,I <sub>D</sub> =-40A	-	8.1	10.5	
Dynamic Characteristics(Note 4)							
Input Capacitance		C <sub>ISS</sub>	V <sub>DS</sub> =-20V,V <sub>GS</sub> =0V,f=1MHz	-	3401	-	pF
Output Capacitance		C <sub>OSS</sub>		-	982	-	pF
Reverse Transfer Capacitance		C <sub>RSS</sub>		-	47	-	pF
Gate Resitance		R <sub>G</sub>	f=1MHz	-	-	-	Ω
Switching Characteristics (Note 4)							
Turn-On Delay Time		t <sub>d(on)</sub>	V <sub>DS</sub> =-20V,R <sub>GEN</sub> =3Ω V <sub>GS</sub> =-10V,I <sub>D</sub> =-40A,	-	13	-	ns
Turn-On Rise Time		t <sub>r</sub>		-	94	-	ns
Turn-Off Delay Time		t <sub>d(off)</sub>		-	66	-	ns
Turn-Off Fall Time		t <sub>f</sub>		-	99	-	ns
Total Gate Charge		Q <sub>G</sub>	V <sub>DS</sub> =-20V,I <sub>D</sub> =-40A, V <sub>GS</sub> =-10V	-	50	-	nC
Gate-Source Charge		Q <sub>GS</sub>		-	7	-	nC
Gate-Drain Charge		Q <sub>GD</sub>		-	7	-	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-20A	-	-	-1.2	V
Maximum Continuous Drain-Source Diode Forward Current		I <sub>S</sub>		-	-	-73	A
Reverse Recovery Time		t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>F</sub> =-20A dI <sub>F</sub> /dt=-100A/μs	-	49	-	ns
Reverse Recovery Charge		Q <sub>RR</sub>		-	52	-	nC

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature

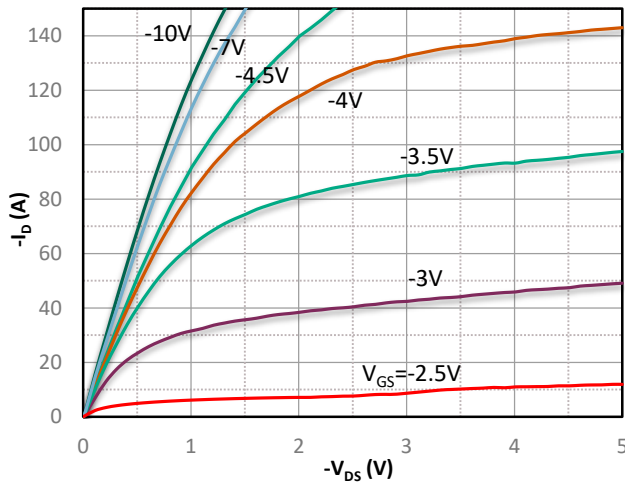
2  $L=0.5\text{mH}$ ,  $I_D=-29V, R_G=25\Omega$ , Starting  $T_J=25^{\circ}\text{C}$

3 Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$

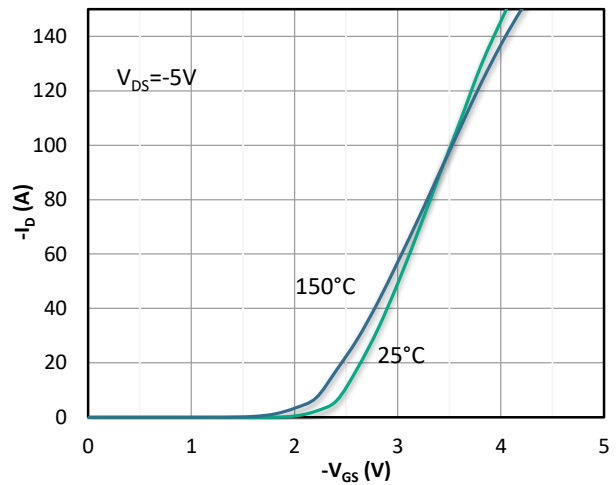
4 Guaranteed by design, not subject to production

## Typical Characteristics Diagrams

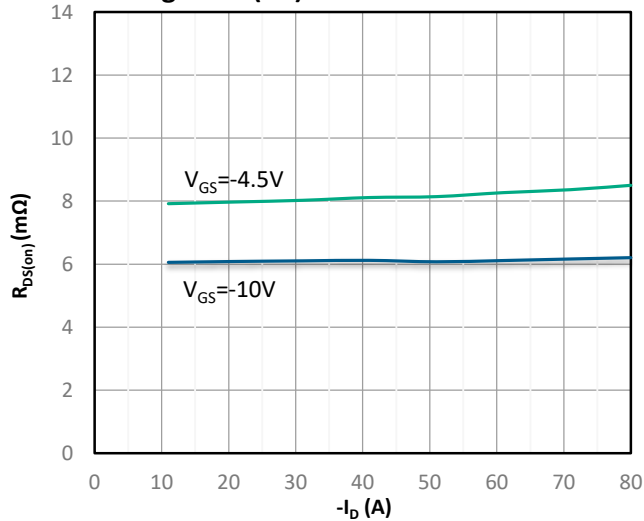
**Fig1. Output Characteristics**



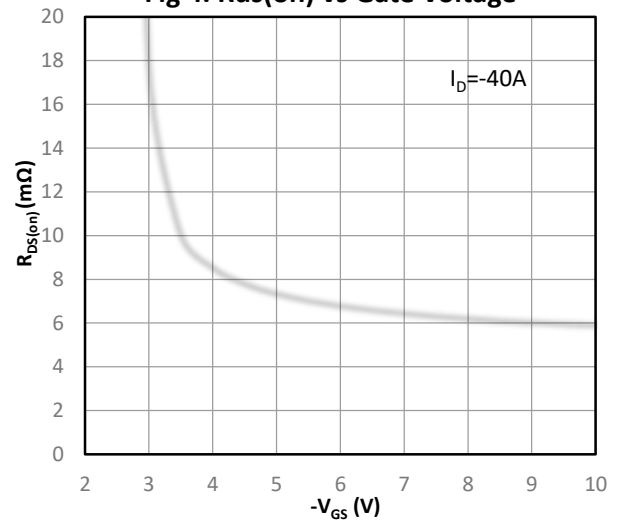
**Fig2. Transfer Characteristics**



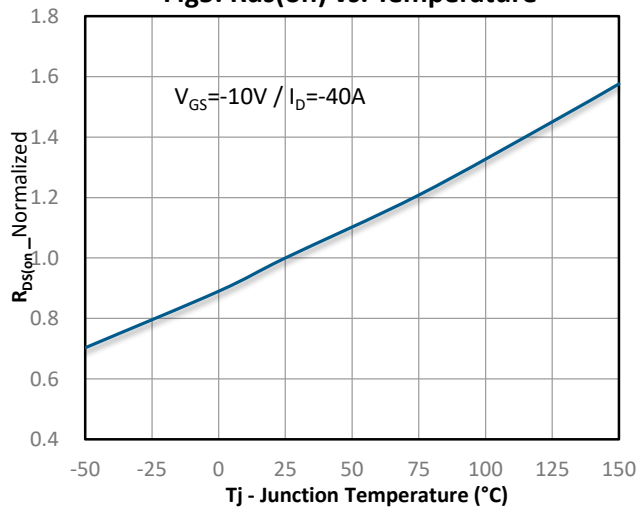
**Fig3. R\_DS(on) vs Drain Current**



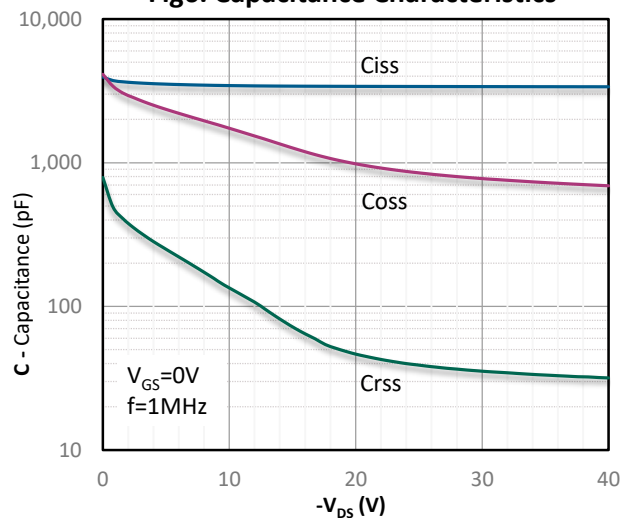
**Fig 4. R\_DS(on) vs Gate Voltage**



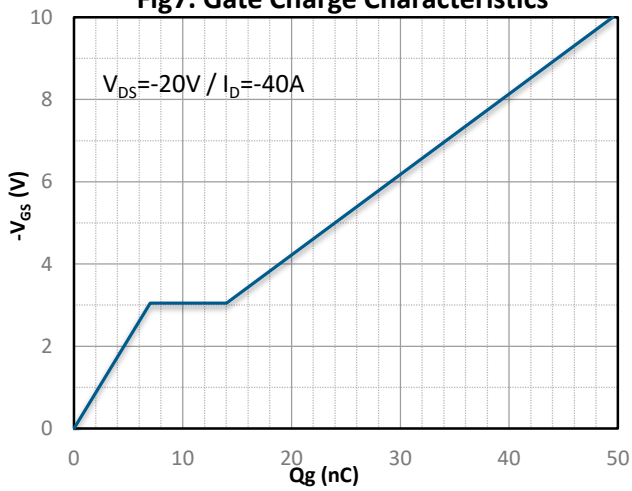
**Fig5. R\_DS(on) vs. Temperature**



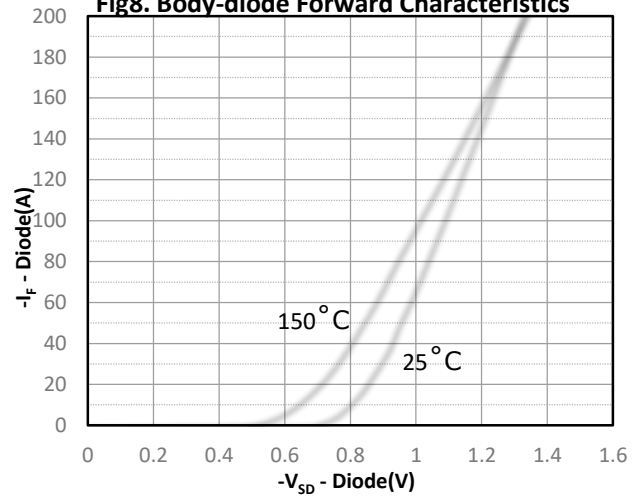
**Fig6. Capacitance Characteristics**



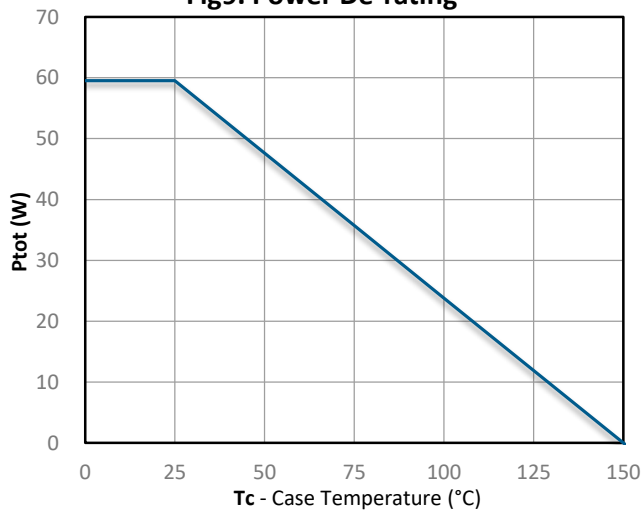
**Fig7. Gate Charge Characteristics**



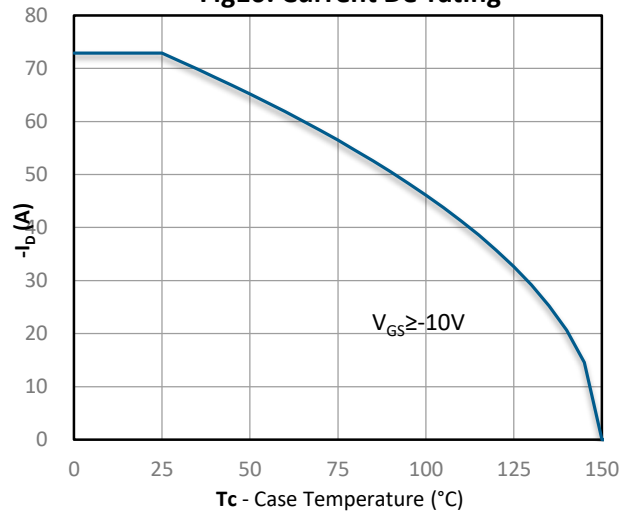
**Fig8. Body-diode Forward Characteristics**



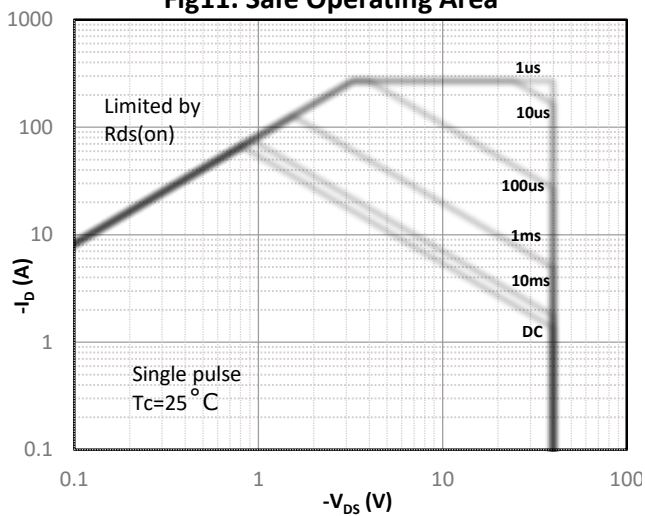
**Fig9. Power De-rating**



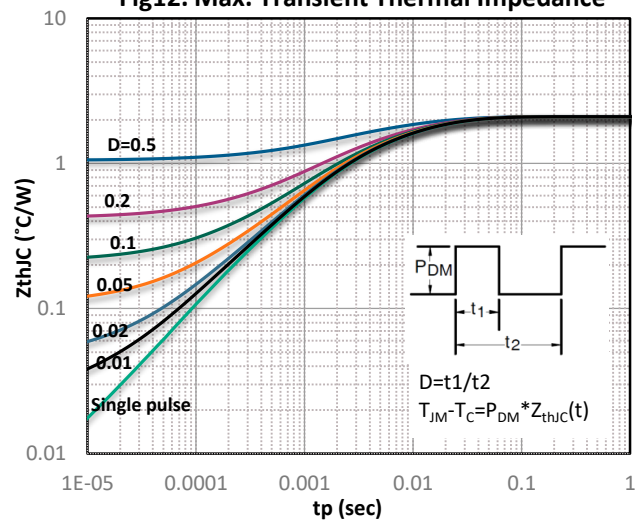
**Fig10. Current De-rating**



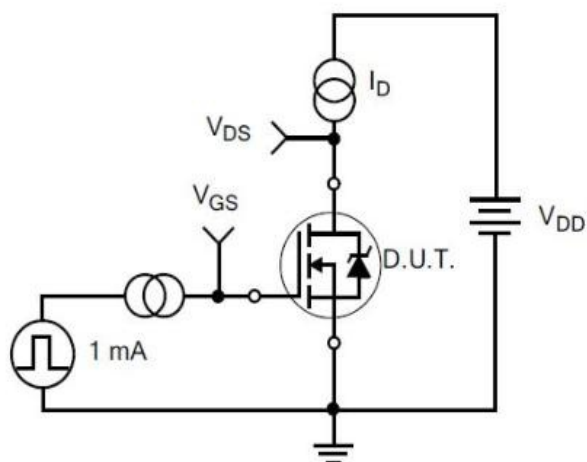
**Fig11. Safe Operating Area**



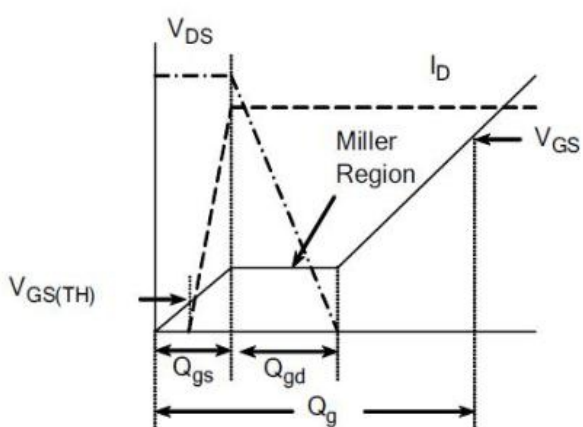
**Fig12. Max. Transient Thermal Impedance**



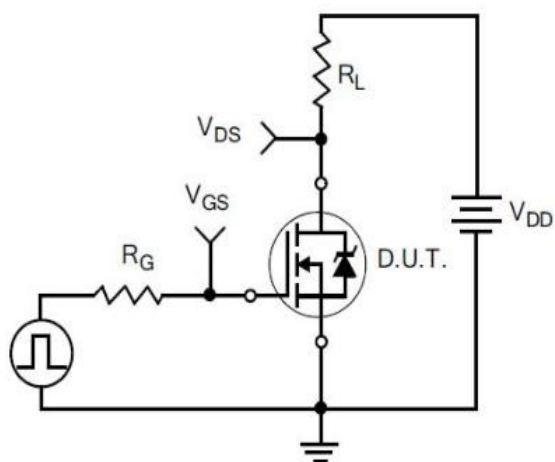
## Typical Test Circuit



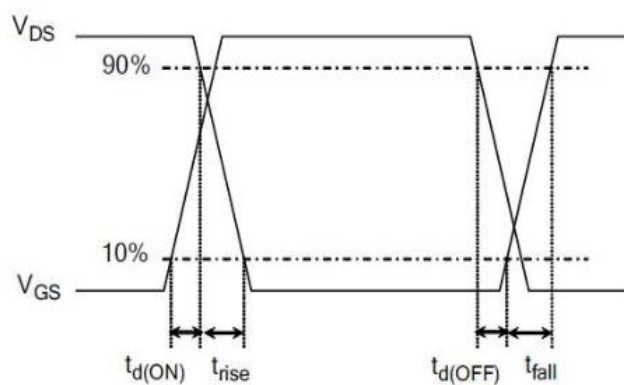
1) Gate Charge Test Circuit



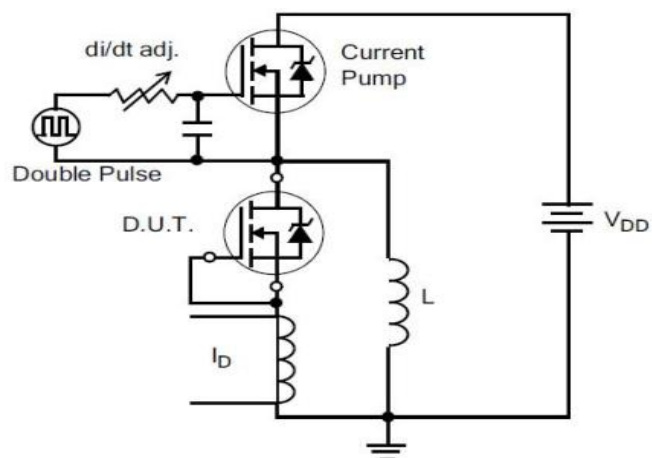
2) . Gate Charge Waveform



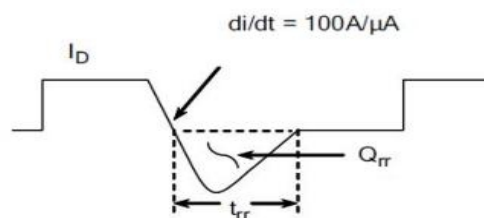
3) Resistive Switching Test Circuit



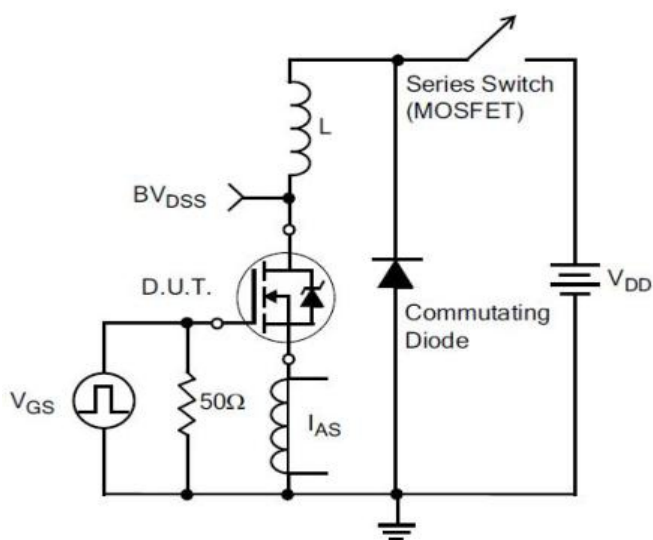
4) Resistive Switching Waveforms



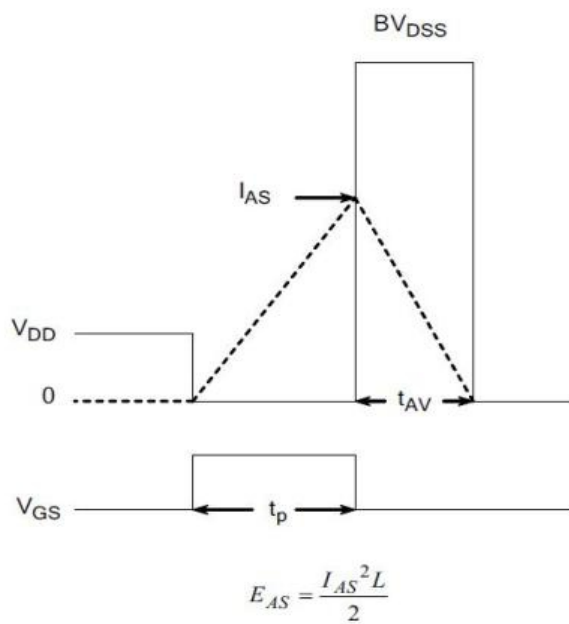
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

## Product Names Rules

X X X X N E X X X

Process Type:  
VDMOS:default  
Super junction:SJ  
Low Voltage trench:D  
Low Voltage SGT:DS

Rated Current Code  
With 3 Digital,  
For Example:  
6.7mΩ:067,  
10mΩ:010,

Channel Code  
N channel:N  
P channel:P

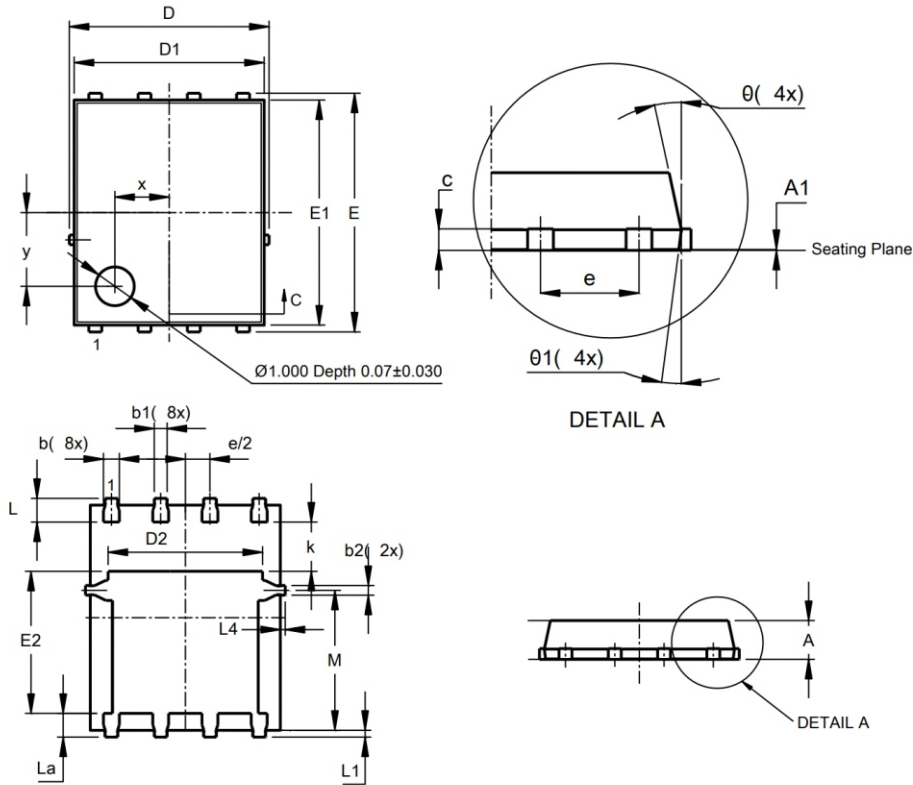
Package Code  
TO-220:Default  
ITO-220:F  
TO-262:E  
TO-263:D  
TO-252:M  
TO-251:N  
TO-263-7L:D7  
TOLL:T  
DFN5×6:G

Rated Voltage Code  
With 2 Digital, For Example:  
600V:60  
60V:06

Special Function Code  
G-S ESD Protection:E  
No Protection:Default

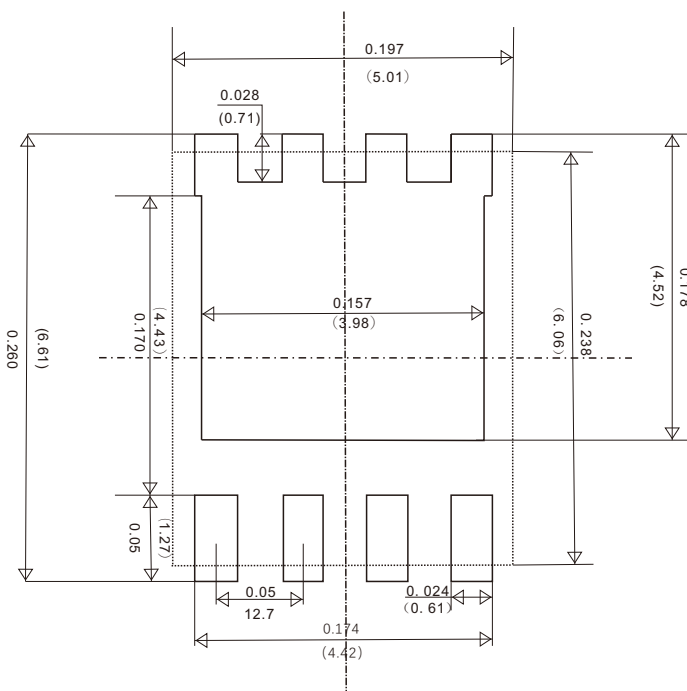
# Dimensions

## DFN5×6 PACKAGE OUTLINE DIMENSIONS



Dim	Min	Max	Type
A	0.90	1.10	1.00
b	0.23	0.41	0.32
b1	0.24	0.30	0.27
b2	0.16	0.32	0.23
c	0.17	0.27	0.22
D	-	-	5.01
D1	4.80	4.95	4.88
D2	-	-	3.98
E	-	-	6.06
E1	5.72	5.82	5.77
E2	3.42	3.52	3.47
k	-	-	1.33
L	0.56	0.66	0.61
La	0.57	0.67	0.63
L1	0.06	0.15	0.11
L4	-	-	0.06
M	3.00	3.20	3.08
Φ	10	11	10.39

## Suggested Pad Layout





## Friendship Reminder

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